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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte VERNON M. WILLIAMS

Appeal 2009-002779
Application 09/511,986
Technology Center 2800

Before MAHSHID D. SAADAT, CARLA M. KRIVAK,
and ELENI MANTIS MERCADER, *Administrative Patent Judges*.

MANTIS MERCADER, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

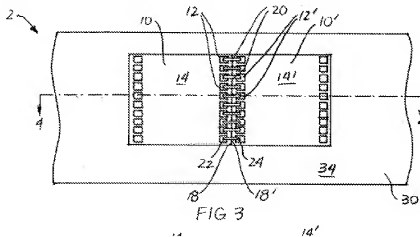
STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the non-final rejection of claims 47, 48, 50-56, 58-68, 75-79, 81-85, and 110-124. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

INVENTION

Appellant's Figure 3 is reproduced below:



Appellant's Figure 3 indicates first and second semiconductor device components 10 and 10' as well as first and second contact pads 12 and 12' (Fig. 3; Spec. 29:14–30:7). At least one conductive element 20 contacts both the first contact pad 10 and the second contact pad 10'. *Id.* The at least one conductive element 20 includes a plurality of superimposed, contiguous, mutually adhered layers 20A, 20B, each of which comprises a conductive material (*see* Fig. 13; Spec. 8:5-11).

Claims 64 and 75, reproduced below, are representative of the subject matter on appeal:

64. A semiconductor device assembly, comprising:

a carrier including contacts and carrying circuitry in communication with the contacts; and
at least one semiconductor die adjacent the carrier, the semiconductor die including bond pads; and
conductive elements extending between and contacting contacts of the carrier and corresponding bond pads to electrically connect circuitry of the at least one semiconductor die with the circuitry of the carrier, each of the conductive elements including a plurality of superimposed, contiguous, mutually adhered layers, each of the layers comprising conductive material.

75. A semiconductor device assembly, comprising:
a first semiconductor device component including at least one first contact pad;
a second semiconductor device component including at least one second contact pad; and
at least one conductive element in contact with both the at least one first contact pad and the at least one second contact pad, the at least one conductive element comprising a plurality of superimposed, contiguous, mutually adhered layers comprising conductive material.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

| | | |
|-----------|--------------|---------------|
| Sullivan | US 4,610,941 | Sep. 9, 1986 |
| Fudim | US 4,752,498 | Jun. 21, 1988 |
| Lee | US 4,954,873 | Sep. 4, 1990 |
| Congleton | US 5,007,576 | Apr. 16, 1991 |
| Matsuki | US 5,969,424 | Oct. 19, 1999 |

The following rejections are before us for review:

1. The Examiner rejected claims 64-66, 68, 75, 77-79, and 81-83 under 35 U.S.C. § 102(e) as being anticipated by Matsuki.
2. The Examiner rejected claims 47, 50-54, 58, 59, 62, 63, 110, 112-116, 119, 120, 123, and 124 under 35 U.S.C. § 103(a) as being unpatentable over Sullivan in view of Fudim.

3. The Examiner rejected claims 48, 55, 56, 60, 61, 111, 117, 118, 121, and 122 under 35 U.S.C. § 103(a) as being unpatentable over Sullivan in view of Fudim and further in view of Lee.

4. The Examiner rejected claims 67 and 76 under 35 U.S.C. § 103(a) as being unpatentable over Matsuki in view of Lee.

5. The Examiner rejected claims 75, 84, and 85 under 35 U.S.C. § 103(a) as being unpatentable over Congleton in view of Matsuki.

ISSUES

The pivotal issues are:

1. Whether Matsuki teaches conductive elements that *contact* contacts of a carrier and corresponding bond pads;
2. Whether Matsuki teaches a plurality of superimposed, contiguous, mutually adhered layers; and
3. Whether the Examiner appropriately combined the teachings of Sullivan in view of Fudim, Sullivan in view of Fudim and Lee, Matsuki in view of Lee, and Congleton in view of Matsuki.

ANALYSIS

Analysis with respect to the rejection of claims 64-66 and 68

Appellant argues (App. Br. 11) that Matsuki does not teach lead wires 7 contacting contact 11 of the carrier 12, because solder ball 10 or a bond wire is required to establish communication between conductive elements 7 and the corresponding contact 11.

We are not persuaded by Appellant's argument. Claim 64 requires the "conductive elements extending between and contacting contacts of the

carrier and corresponding bond pads to electrically connect circuitry of the at least one semiconductor die with the circuitry of the carrier.” Thus, the Examiner (Ans. 12) correctly reasoned that the claim does not require the conductive elements make *direct* physical contact with the contacts.

Appellant further argues that Matsuki does not disclose a plurality of superimposed, contiguous, mutually adhered layers that contact bond pad 4 and contact 11 (App. Br. 11). We are not persuaded by this argument.

Matsuki’s Figures 2 and 1B are depicted below:

FIG. 2

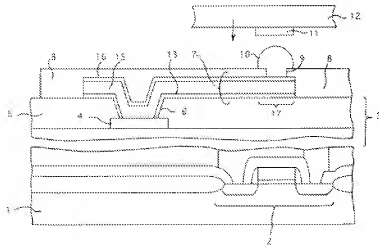
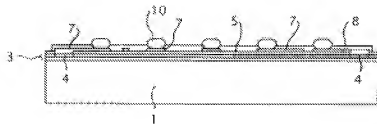


FIG. 1B



Matsuki’s Figure 2 shows a semiconductor device and Matsuki’s Figure 1B shows bond pads 4 and conductive elements 7 (col. 6, ll. 4-10).

Matsuki discloses conductive elements 7 including a plurality of superimposed, contiguous, mutually adhered layers (Fig. 2, metallic layers 13, 15, and 16 of conductive element 7; *see also* col. 8, ll. 29-44) that contact bond pad 4 (referring to plurality of bond pads 4 in Figure 1B) and electrically contacting contacts (or wires) 11 (col. 7, l. 30). Matsuki teaches that during bonding, contacts 11 are connected to bumps 10 (col. 9, ll. 11-18). Thus, while the conductive element 7 and the contact 11 are not directly contacting each other, they are nonetheless contacting each other through the intervening solder ball 10. Note that the claim does not require “direct” contact, and thus, Appellant’s argument is not commensurate with the scope of the claim.

For the reasons articulated *supra*, we will affirm the Examiner’s rejections of claim 64 and for similar reasons the rejections of claims 65, 66, and 68.

Analysis with respect to the rejection of claims 75, 77-79, and 81-83

Appellant (App. Br. 12) reiterates with respect to claim 75 the same argument regarding the conductive element 7 and the contact 11 and states that they do not directly contact each other, but rather, have an intervening solder ball 10. For the same reason articulated above, we are not persuaded by Appellant’s argument.

Appellant (App. Br. 13) also argues, with respect to claims 82 and 83, that Matsuki does not teach any express or inherent description that the carrier 12 includes a conductive trace carried by a support structure thereof and in communication with contact 11, wherein the carrier 12 includes a plurality of superimposed, contiguous, mutually adhered layers. Appellant

(App. Br. 13) states that Matsuki merely describes the lead wire 7 including multiple layers 13, 15, and 16.

The Examiner reasoned (Ans. 13-14), and we agree, that the carrier substrate includes layers 1, 3, 5, and 12 (*see* Fig. 2) because Matsuki teaches that layer 1 is a substrate (col. 6, l. 56), layer 5 is a substrate (col. 6, l. 63), and layer 12 is a substrate (described in Matsuki as a carrier, col. 7, ll. 28-30).

We also agree with the Examiner (Ans. 13-14), that claim 82 requires and Matsuki teaches a carrier substrate (i.e., layers 1, 3, 5, and 12) including a support structure (i.e., layer 12), wherein bonding contacts 11 are connected to bumps 10, the carrier substrate supports chip 2, and at least one conductive trace (i.e., conductive element 7) comprising a plurality of superimposed, contiguous, mutually adhered layers 13, 15, and 16 of material (Matsuki, col. 7, ll. 28-34). Note that claim 83 requires at least one of the conductive trace and the support structure have the superimposed layers, and this limitation is met by Matsuki's conductive trace 7 comprising a plurality of superimposed, contiguous, mutually adhered layers 13, 15, and 16 (*id.*).

Accordingly, we will also affirm the Examiner's rejections of claims 75, 82, and 83 and also the rejection of claims 77-79 and 81 by virtue of their dependency from claim 75 because Appellant did not present any further arguments with respect to these claims (App. Br. 13).

Analysis with respect to the rejection of claims 47, 50-54, 58, 59, 62, 63, 110, 112-116, 119, 120, 123, and 124

Appellant (App. Br. 16) argues that the Examiner disregarded the "plurality of . . . layers" in independent claims 47, 52, 110, and 114 by stating that such layers would be "indistinguishable from one another, and

thus can be considered as one layer.” Appellant (App. Br. 17) further argues that neither Sullivan nor Fudim teaches or suggests a conductive trace that comprises a conductive polymer as recited in independent claims 47, 52, 110, and 114.

The Examiner reasons (Ans. 14) that a plurality of identical superimposed, contiguous, mutually adhered conductive polymer layers that are indistinguishable from one another are not structurally different from one conductive polymer layer being arbitrarily divided into different sections/layers. Therefore, a plurality of identical superimposed, contiguous, mutually adhered conductive polymer layers can be considered as one conductive polymer layer being arbitrarily divided into different sections/layers.

We also agree with the Examiner’s findings of fact and reasoning that Fudim teaches, in Figures 3A and 4B, solidifying liquid conductive polymer 11 (the thick lines in Figure 4B) in order to obtain conductive polymer 25b. In particular, Fudim teaches that this process can be repeated many times (col. 4, ll. 5-6), which means that a plurality of layers are formed on top of each other. We also agree with the Examiner (Ans. 14) that although Fudim teaches forming a plurality of layers, solidifying liquid polymer material multiple times can result in one indistinguishable conductive polymer layer. In other words, there is no structural difference between a conductive polymer that is formed by solidifying the liquid polymer one time (that is, one layer is formed) and a conductive polymer that is formed by solidifying the liquid polymer plurality of times (that is, plurality of layers are formed).

For the foregoing reasons, we will also sustain the Examiner's rejection of claims 47, 50-54, 58, 59, 62, 63, 110, 112-116, 119, 120, 123, and 124.

Analysis with respect to the rejection of claims 48, 55, 56, 60, 61, 111, 117, 118, 121, and 122

We will also sustain the Examiner's rejection of claims 48, 55, 56, 60, 61, 111, 117, 118, 121, and 122 because Appellant (App. Br. 18) does not present any additional arguments of patentability but rather relies on the dependency of these claims from independent claims 47, 52, and 110.

Analysis with respect to the rejection of claims 67 and 76

Appellant (App. Br. 18-20) asserts that the anisotropic elastomeric conductors of Lee are sheets with conductive elements that extend transversely (e.g., perpendicularly) relative to the planes thereof, not laterally along the planes. Appellant (App. Br. 18-20) purports that if the anisotropic elastomeric conductors were to be used as the lead wires 7 of the assembly as taught in Matsuki, the conductive elements would only be able to conduct electricity between the upper and lower surfaces of the lead wires 7, not along the lengths. Accordingly, Appellant concludes that the electricity could not be communicated from a bond pad 4 at one end of such a lead wire 7 to a secondary pad 17 at the other, i.e., at the terminal end of the lead wire 7. Appellant (App. Br. 19) asserts Matsuki requires that electricity be conducted along the lengths of lead wires 7 to establish communication between bond pads 4 and contacts 11, and as such, one of ordinary skill in the art would not have had a reason to expect that the combination of Matsuki and Lee would have been successful.

As the Examiner pointed out (Ans. 17), Lee teaches that the elastomer, acting as an electrically conductive interface, can advantageously

conform closely to the contours of *both surfaces of the devices which are being coupled* (col. 3, ll. 2-5). Thus, if the lead wires 7 of Matsuki were made of elastomeric material, there would be communication between bond pads 4 and contacts 11 and the lead wire 7 would conform closely to the contours of both surfaces 11 and 4 which are being coupled.

Accordingly, we will also sustain the Examiner's rejection of claims 67 and 76.

Analysis with respect to the rejection of claims 75, 84, and 85

We are also not persuaded by Appellant's arguments (App. Br. 20-22) regarding the combinability of Congleton with Matsuki, and we adopt the Examiner's findings of fact and conclusions as recited in the Examiner's Answer (Ans. 17-18). Accordingly, we will also sustain the Examiner's rejections of claims 75, 84, and 85.

CONCLUSIONS

1. Matsuki teaches conductive elements that *contact* contacts of a carrier and bond pads;
2. Matsuki teaches a plurality of superimposed, contiguous, mutually adhered layers; and
3. The Examiner appropriately combined the teachings of Sullivan in view of Fudim, Sullivan in view of Fudim and Lee, Matsuki in view of Lee, and Congleton in view of Matsuki.

ORDER

The decision of the Examiner to reject claims 47, 48, 50-56, 58-68, 75-79, 81-85, and 110-124 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

babc

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